



GRWG-I Day 2



Summary Day 1

- ❖ Received briefings on GSICS, GEOSS, and WMO Space Program that put our work into perspective
- ❖ Reviewed methodologies that have been applied for GEO-LEO inter-calibration
- ❖ Assigned three tasks for GRWG-I



Summary Day 2

- ❖ Consensus methodology for GEO-LEO IR sensors inter-calibration
 - Focus on AIRS initially, expand to other sensors later (IASI, MODIS, AVHRR, HIRS)
 - Consider agency priority, opportunity, and operation issues while designing algorithm
 - Major components discussed and summarized in later slides
- ❖ Tools to be generated and shared
 - Web site
 - Exchange information
 - Summary of sensor characteristics (Wu, in collaboration with members)
 - Summary of lessons learned
 - Mission statement etc.
 - Consensus algorithm
 - Pseudo code
 - AIRS and GEO data for 2 Nov 2006
 - JMA provide re-navigated MTSAT-1R data
 - UW/SSEC provide spectral conversion
 - These should be available by Feb. 23
 - Each GPRC sends results based on the above by April 1
 - One month data (Nov. 2006 or a month in future with IASI, TBD by 1 Apr 2007) for algorithm development
- ❖ GRWG-II
 - In June, in Europe, in conjunction with the first GSICS Data Working Group
 - Topics
 - Progress on GEO-LEO IR inter-comparison
 - Expansion to VISNIR spectrum
 - LEO-LEO



Issues to Consider in Algorithm Design

- ❖ **What questions do you likely to ask about the GEO-LEO difference?**
 - Are we sure?
 - Why?
 - What to do?
 - ?
- ❖ **What results do you expect from the inter-calibration?**
 - **Correct** measurements – Identify one perfect instrument and use it to calibrate the rest
 - There exists one instrument that, if not perfect, is always the best by any means
 - Is there, or will there ever be?
 - **Consistent** measurements – Identify one reference instrument and use it to calibrate the rest
 - Trend is all that matters
 - Is “relative calibration” all we need?
 - **Improved** measurements – Identify which instrument performs better/worse under what circumstances
 - No instrument is perfect, in fact every instrument may contribute some
 - Measurements are increasingly redundant in some way
 - Is there an end for this?
 - **Interaction with vendors**



Instrument Calibration

❖ Stabilized

- Scan mirror emissivity
- Temperature variation

❖ Spin-scan

- Vicarious calibration

❖ LEO

- Imaging instruments (AVHRR, MODIS)
- Sounding instruments (HIRS, AIRS, IASI)



Operational Issues



❖ Algorithm Maintenance

- ?

❖ Benchmark

- Code (or pseudo-code)
- Test data
- Test results

❖ Content and Format for Data

- Attributes of Input Data
- Result



Discussion

❖ Time

- Existing
 - Typically larger than LEO-LEO (>5 minutes)
 - Out of control – vary by GEO
- Proposed
 - Principle: Collect all and down-select later, **to the extend** that the data volume is manageable
 - Threshold: 15 min, since refresh rate of most GEO < 30 min
- Suggestions
 - Error budget
 - Schedule GOES
 - Cost-Benefit analysis



Discussion



❖ Space

- Existing
 - Correlation-based correction to navigation error
 - Detailed consideration of MTF/PSF
 - Histogram
 - Average
- Proposed
 - Principle: Rely solely on spatial homogeneity
 - Threshold: GEO channel T_b stdv $< 1K$ within 50 km
- Suggestions:
 - Threshold depends on scene T_b ?
 - Threshold on other channels (e.g., MODIS)?
 - Other measure of homogeneity (e.g., max-min)?



Discussion



❖ Scene

- Existing
 - All
 - Separately for clear and cloud
- Proposed
 - Principle: Collect all and select/analyze later
 - Threshold: None



Discussion



❖ Geometry

■ Existing

- Viewing zenith angles constrained
- Relative azimuth constrained or not
- Near nadir

■ Proposed

- $\delta \sec(\theta) < 0.05$
- Nadir and off-nadir
- Azimuth angle φ recorded



Discussion



❖ Spectrum

■ Existing

- Tobin: Requires atm. state parameters & RTM
- Tahara: Constrained optimization
- Gunshor: Fill with calculated spectrum

■ Proposed

- Tobin's method
- Evaluate his choice of profiles and RTM later



Discussion



❖ Coverage

■ Existing

- Not considered for area-to-area comparison
- Within X of the center of LEO pixel center in pixel-to-pixel comparison

■ Proposed

- The distance between the LEO-GEO pixel centers is less than the major half axis of the LEO FOV